substrates is provided as follows:

> "[d]uring the drain cycle, atmospheric oxygen is rapidly supplied to the de-watered and relatively thin (from about 1 micron to about 2 millimeters thick) microbial biofilms residing on backfill substrate, i.e., river gravel and/or limestone, and/or any other appropriate substrate, thus promoting growth of aerobic bacteria which are responsible for oxidizing ammonia (nitrification), various heavy metals, and other toxic compounds."

The Examiner interprets this language to mean that Behrends unequivocally teaches the use of river gravel and limestone together to treat acidic mine drainage. Indeed, in response to Applicants' argument that Behrends should not be interpreted in that manner, the Examiner, in the present Office Action, holds that "Behrends discloses: `[B]iofilms residing on backfill substrate, [that is,[1] biofilms residing on river gravel, biofilms residing on limestone, biofilms residing on river gravel and limestone, biofilms residing on river gravel and any other appropriate substrate, biofilms residing on limestone and any other appropriate substrate, biofilms residing on river gravel, limestone and any other appropriate substrate, and biofilms residing on any appropriate substrate other than river gravel or limestone]. The Examiner then invites Applicants to provide a §132 Declaration from a university or college English professor to explain whether or not the "and/or" terminology used in Behrends should be interpreted in this manner.

The Examiner is curious as to whether it is reasonable to question what "and/or" means, and Applicants submit that it most certainly is reasonable to question the use of such language. Submitted herein is an excerpt from Bryan A. Garner's *A Dictionary of Modern Legal Usage*, Second Edition, Oxford University Press (1995), wherein, although it is admitted that the specific meaning of "x and /or y" is "x or y or both," it is noted that "and/or" "lends itself . . .as much to ambiguity as to brevity." It is also noted that various courts have looked upon "and/or" with disfavor, with at least one court noting that "the highly objectionable phrase *and/or* . . . has no place in pleadings, findings of fact, conclusion of law, judgments or decrees, and least of all in instructions to a jury." Another court has noted: "[T]o our way of thinking

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[1] The Examiner is replacing the use of "i.e." in the Behrends reference with "that is," which is a fairly good translation of "i.e." Notably, "i.e." literally means "that is to say."

the abominable invention *and/or* is as devoid of meaning as it is incapable of classification by the rules of grammar and syntax."Another court has noted that "and/or" may even be used by lawyers "as a cunning device to conceal rather than express meaning." Applicants submit that "and/or" has the tendency to confuse rather than clarify meaning in patent applications, wherein specificity of disclosure is highly important. Thus, it is absolutely reasonable to question what "and/or" means. While, "and/or" does have a specific meaning, it is often employed incorrectly and very rarely offers precision in meaning.[2] In Behrends, ""and/or" simply does not teach what the Examiner contends.

The Examiner's interpretation of the cited section of Behrends, as set forth in the present Action, at page 2, is incorrect. The Examiner claims that Behrends discloses biofilms residing on river gravel, biofilms residing on limestone, biofilms residing on river gravel and limestone, etc., as if the "*i.e.*, river gravel and/or limestone, and/or any other appropriate substrate" portion of the cited section modifies the biofilms and where they reside, and, thus, teaches biofilms residing on river gravel and limestone at the same time. This interpretation is incorrect, because the "i.e." clause only modifies "substrate" and provides "river gravel and/or limestone and/or any other appropriate substrate" only as examples of potential substrates. This distinction is significant in that Behrends never conclusively teaches that both river gravel and limestone can be employed at the same time to promote the growth of biofilms on such a mixed substrate. Rather, at best, Behrends teaches that a singular substrate may be selected from river gravel or limestone or any other appropriate substrate. Indeed, the "and" in the "and/or" language does not necessarily lead one to the conclusion that a backfill substrate in Behrends may be a mixture of two materials. It is important to note that the sentence directly before the cited portion of Behrends reads as follows: "With the concept of recurrent reciprocation, **the wetlands' substrates** (backfill) and their associated biofilms are exposed to atmospheric oxygen concentrations at frequent and intermittent intervals via the

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[2] Applicants sincerely hope that Bryan A. Garner is considered enough of a "credentialed expert" for the Examiner.

sequential and recurrent filling and draining of paired contiguous wetland cells. [3] In the very next sentence, wherein "backfill substrate" is followed with "i.e., river gravel and/or limestone, and/or any other appropriate substrate," it should be appreciated that multiple wetlands and multiple substrates are being considered, such that Behrends teaches nothing of employing river gravel and limestone together. Rather, inasmuch as Behrends is speaking of multiple substrates employed in multiple wetland cells it is impossible to tell whether river gravel and limestone are taught as being supplied together as one backfill substrate or whether they are to be provided one in one wetland cell and the other in another wetland cell.

From the foregoing, we see that it is likely that the "and/or" language employed in Behrends was simply a sloppy way of providing a list of potentially useful singular substrates that could be employed across a large number of wetlands, each with a plurality of paired cells. There is certainly no sufficient disclosure within Behrends to inform the reader that the river gravel and limestone are to be used together. "It is well settled that prior art under 35 U.S.C. § 102(b) must sufficiently describe the claimed invention to have placed the public in possession of it."[4] Particularly, "the reference must put th anticipating subject matter at issue into the possession of the public through an enabling disclosure."[5] If Behrends is fully considered for all that it teaches, it is clear that it does not place the public in possession of a process for removing metals from an aqueous solution that includes the steps of contacting the solution with at least one lithic neutralizing agent and at least one lithic precipitating agent that preferentially precipitates metals from the aqueous solution. Behrends is too unclear with respect to its substrate disclosure and does not provide an enabling disclosure ~~at~~ as to mixing substrates. Those portions of Behrends cited by the Examiner serve only to confuse the reader as to the identity of useful substrates. Those of ordinary skill in the art would interpret the "and/or" language as merely a generic connector between potential singular substrates,

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[3] Behrends '433 at Col. 7, line 66 /Col. 8, line 4. (emphasis added)

[4] *See In re Donahue*, 766 F.2d 531, 533 (1985), See also *Reading & Bates Construction Co. v. Baker Energy Resources Corp.*, 748 F. 2d 645, 651-52 (Fed. Cir. 1984).

[5] *See Chester v. Miller*, 15 U.S.P.Q. 2d 1333, 1336 (Fed. Cir. 1990) (footnote 2, citing *In re Donahue*).

especially in light of the fact that, in each and every example provided in Behrends, a singular substrate is employed, and further in light of the fact that it is the general practice in the art to employ singular substrates. Because Behrends fails to place the public in possession of the claimed process, the claimed process is not anticipated by Behrends, and reconsideration of claims 1-4, 8, 9 and 11 is respectfully requested.

In response to the Examiner's contention that Applicants' prior argument was premised on the point that a substrate may not be a mixture of different materials, Applicants note that they never made such an argument. Rather, Applicants argued that Behrends does not teach the use of a mixture of river gravel and limestone, as the Examiner held. Regarding the Examiner's comments respecting Applicants' description of flowing a solution "through a gravel form of at least one neutralizing agent and at least one precipitating agent," it is noted that "a gravel form" can relate to more than a homogenous material because Applicants have defined it as such in their specification. The Examiner's comments on page 3 of the present Office Action are not well taken inasmuch as the Examiner appears to be comparing apples and oranges. The Examiner compares "substrate" to "a gravel form" and also ignores the fact that an applicant can be his own lexicographer to shed light on the meaning of certain terms. Indeed, at page 6, lines 25-29 of the present specification it will be seen that Applicants have sufficiently disclosed how to interpret "a gravel form" as it relates to their own disclosure, regardless of how "a gravel form" may be interpreted in somebody else's disclosure or in some other context.

The Examiner states that Applicants have not shown or demonstrated any unexpected results with respect to the use of Behrends in the §103 rejection of claim 7, and, with respect to claim 7, the Examiner is correct. Particularly, Applicants rely upon the fact that Behrends does not anticipate the independent claim upon which claim 7 is based. But notably, Applicants' have demonstrated unexpected results, particularly with respect to the Examiner's application of Burke, Budiet, and Stafford to reject claims 1-6 as obvious. Before turning to that rejection, Applicants note that it is unclear to them as to how the Examiner is applying Behrends in the § 103 rejection of claim 7 in light of the unexpected results that the Examiner

would "like to see." [6]

The Examiner maintains the rejection of claims 1-6 as obvious over Burke, Budiet, and Stafford. In their prior response, Applicants traversed this rejection by explaining the unexpected results that are obtained by designing a system that purposefully juxtaposes a neutralizing agent and precipitating agent as currently claimed. Particularly, Applicants relied upon Example 3 and Table 4 from their specification. The arguments presented in Applicants' prior response are incorporated herein by reference.

The Examiner presently holds that the "unexpected results" submitted to support an argument against obviousness are unsupported by probative evidence. The Examiner states that it is not clear from Table 4 how much sandstone was used in the "sandstone [only] "test and how much limestone was used in the "limestone [only]" test, and incorrectly states that the amounts of each were reported only for the mix test, wherein 5 grams of limestone and 5 grams of sandstone were employed. The Examiner did not critically consider Table 4, because Table 4 clearly notes that "[b]atch reactors with 10 grams of solid material and 100 mL of Silver Creek water spiked with ferrous iron (pH = 4.5)"were employed. The "solid material" is "Tuscarora sandstone" for the "sandstone [only]" test and is "Columbus limestone" for the "limestone [only]" test. The level of metal removal achieved in the batch reactor with mixed solid material is certainly unexpected considering the level of removal achieved with sandstone only and limestone only. Applicants' "unexpected results" arguments are supported by probative evidence, and reconsideration of all obviousness rejections is respectfully requested, including the obviousness rejection that adds Weihe or Watton to Burke, Budiet, and Stafford. The Examiner has not responded to Applicants arguments regarding the rejection of claims 8-11 as obvious over Watton in view of Chapman, and Applicants would

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[6] Particularly, it is unclear to the Applicants' why they would have to show "better results using a mixture of neutralizing agents and precipitating agent vs. sequential treatment of the solution first through a bed of either only neutralizing agent (or only precipitating agent) followed by passage through a bed of only precipitating agent (or neutralizing agent), respectively. Applicants respectfully request that the Examiner set forth his rejections in detail rather than simply citing the portions of a patent and then leaving it up the Applicants to respond. It would appear that the Examiner has a somewhat involved §103 rejection in mind with respect to the application of Behrends to claim 7, but this application has not been particularly set forth in any office action. Applicants are surely prejudiced by the Examiner's lack of specificity.

like the record to reflect that this rejection has been overcome.

The Examiner has rejected claim 10 under § 112 on the basis that it is unclear what an "alternating ring" is from the specification. In response, Applicants cite to their specification at page 6, line 30 to page 7 line 5, wherein it is noted that the pipe may be "lined with the at least two agents." It should be clear that pipes are typically circular, such that they could be lined with alternating rings of neutralizing and precipitating agents with the hole in the ring providing the conduit through which the aqueous solution may pass. Applicants contend that claim 10 is clear.

In light of the foregoing, a Notice of Allowance for all pending claims is respectfully requested. Should the Examiner wish to discuss any of the foregoing in greater detail, the undersigned attorney would welcome a telephone call. If the Examining Attorney is to maintain his objection to Applicants unexpected results argument, Applicants would greatly appreciate a better explanation as to the Examiner's position regarding what type of unexpected results data needs to shown and why the present showing is not considered sufficient. Further, if such rejections are maintained Applicant's submit that the finality of the present Office Action is improper inasmuch as it would appear that the Examiner has not made his position clear, to the prejudice of Applicants.

Respectfully submitted,

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by the abrupt period ending the sentence and may even wonder whether a part of the enumeration has been inadvertently omitted. One may occasionally omit *and* before the final element in an enumeration with a particular nuance in mind: without *and* the implication is that the series is incomplete—rhetoricians call this construction "asyndeton"; with *and* the implication is that the series is complete. This shade in meaning is increasingly subtle in modern prose. For examples drawn from the writings of Benjamin N. Cardozo, Karl Llewellyn, and Gerald Gunther, see Bryan A. Garner, *The Elements of Legal Style* 159–60 (1991).

Finally, on the question of punctuating enumerations, the best practice is to place a comma before the *and* introducing the final element. See PUNCTUATION (C)(2).

and etc. See **etc.**

and his children; and her children. This phrase ought to be avoided in wills because it gives rise to an interpretative dilemma: is the phrase one of limitation, i.e., does it indicate the size of the estate given? Or is it one of purchase, i.e., does it indicate a gift also to the afterborn children themselves? See **words of purchase.**

and his heirs; and her heirs. These phrases are quintessential pre-20th-century TERMS OF ART—pieces of magical language—formerly necessary to create a fee-simple interest. They are no longer necessary, as it is now possible to say, "I convey to you Blackacre in fee simple," and the words will have that very effect.

and/or. A. General Recommendation. A legal and business expression dating from the mid-19th century, *and/or* has been vilified for most of its life—and rightly so. The upshot is that "the only safe rule to follow is not to use the expression in any legal writing, document or proceeding, under any circumstances." Dwight G. McCarty, *That Hybrid "and/or,"* 39 Mich. State B.J. 9, 17 (1960). Many lawyers would be surprised at how easy and workable this solution is. See **either (D).**

B. A Little History. Lawyers have been among *and/or*'s most ardent haters, though many continue to use it. The term has been referred to as "that befuddling, nameless thing, that Janus-faced verbal monstrosity, neither word nor phrase, the child of a brain of someone too lazy or too dull to express his precise meaning, or too dull to know what he did mean, now commonly used by lawyers in drafting legal documents, through carelessness or ignorance or as a cunning device to conceal rather than express meaning." *Employers' Mut. Liab. Ins. Co. v. Tollefsen,* 263 N.W. 376, 377 (Wis. 1935) (per Fowler, J.). Another court has stated: "[T]o our way of thinking the abominable invention *and/or* is as devoid of meaning as it is incapable of classification by the rules of grammar and syntax." *American Gen. Ins. Co. v. Webster,* 118 S.W.2d 1082, 1084 (Tex. Civ. App.—Beaumont 1938) (per Combs, J.).

These views, in retrospect, are more amusing than insightful. *And/or,* though undeniably clumsy, does have a specific meaning (*x and/or y* = *x or y or both*). But, though the phrase saves a few words, it "lends itself . . . as much to ambiguity as to brevity . . . it cannot intelligibly be used to fix the occurrence of past events." *Ex parte Bell,* 122 P.2d 22, 29 (Cal. 1942). *And/or* "commonly mean[s] 'the one or the other or both.'" *Amalgamated Transit Union v. Massachusetts,* 666 F.2d 618, 627 (1st Cir. 1981). (See the quotation under **amphibology.**) This definition suggests the handiest rewording: a good way to avoid the term is to write *unlawful arrest or malicious prosecution, or both,* instead of *unlawful arrest and/or malicious prosecution.*

Sometimes *and/or* is inappropriate substantively as well as stylistically. Many types of legal documents have been spoiled by the indecisiveness of *and/or:*

- a finding of fact ("associate and/or employ");
- a pleading ("office and/or agent");
- an affidavit ("fraud and/or other wrongful act");
- a will ("to Ann and/or John");
- an indictment ("cards, dice, and/or dominoes");
- a judgment (in an action that described the plaintiff by the formula *Jones and/or Jones, Inc.*).

Courts have not been kind to the word—e.g.: [T]he highly objectionable phrase *and/or* . . . has no place in pleadings, findings of fact, conclusions of law, judgments or decrees, and least of all in instructions to a jury. Instructions are intended to assist jurors in applying the law to the facts, and trial judges should put them in as simple language as possible, and not confuse them with this linguistic abomination." *State v. Smith,* 184 P.2d 301, 303 (N.M. 1947).

Moreover, the term gives a false sense of precision when used in enumerations: "In an enumeration of duties or powers, either conjunction is generally adequate. If *or* is used, no one would seriously urge that if one enumerated duty or power is performed or exercised, the remainder vanish; and if *and* is used, no one would say that an enumerated duty or power cannot be exercised or performed except simultaneously with all the

others." Elmer A. Driedger, *The Composition of Legislation* 79 (1957).

C. Editing the Hieroglyph. Sometimes *and/or* ought to be replaced by *and* itself—e.g.: "There is usually a blackboard, on which issues *and/or* [read *and*] votes may be recorded." Robin T. Lakoff, *Talking Power: The Politics of Language in Our Lives* 122 (1990). (No one would seriously suggest that both issues and votes must be recorded on such a blackboard in a jury room.)/ "Mr Pearce *and/or* [read *and*] his publisher are to be congratulated for working so fast." Joe Rogaly, *Behind the Man from Nowhere,* Fin. Times (Weekend), 27–28 April 1991, at xviii. (If the book has come out promptly, then both the author and the publisher must have worked fast.)

At other times, *and/or* ought to be replaced by *or*—e.g.: "The legal disadvantages of illegitimacy can mostly be avoided by making a will *and/or* [read *or*] adopting the child . . . ." Glanville Williams, *The Sanctity of Life and the Criminal Law* 121 (1957). (No one would seriously suggest that one could be put to an election between making a will and adopting a child—i.e., that one could not do both.) For dealing with the construction *either . . . and/or,* see **either (E).**

D. *Or/and.* This reversal of the words is a rare variant of *and/or* with none of the latter's virtues, and all its vices. Rather than hopelessly confuse readers by resorting to its pretended nuance, one should abstain from it completely.

and other good and valuable consideration. This phrase, used in consideration clauses of contracts, is sometimes false, as when all the legal consideration for the contract given is mentioned explicitly. The phrase should be avoided unless it serves a real function; that is, unless the rest of the items of consideration are too numerous and individually trifling to merit specific inclusion, or unless the parties to the contract do not wish to recite the true price in a publicly recorded document. The drafter of a contract should have some purpose in mind in using this phrase. For the distinction between *good consideration* and *valuable consideration,* see **consideration (D).**

and which. See **which (C).**

anecdotal; anecdotic(al). The first is standard; the other forms are NEEDLESS VARIANTS. In reference to evidence, *anecdotal* refers not to anecdotes, but to personal experiences of the witness testifying. Leff trenchantly calls *anecdotal evidence* "a term of abuse in assessing a social science argument." Arthur A. Leff, *The Leff Dictionary of Law,* 94 Yale L.J. 1855, 2023 (1985). E.g., "In probing discriminatory intent, the trial court may examine the history of the employer's practices, *anecdotal* evidence of class members, and the degree of opportunity to treat employees unfairly in the appraisal process."

anent. Bernstein writes, "Except in legal usage, *anent* [= about] is archaic and semiprecious." Theodore M. Bernstein, *More Language That Needs Watching* 24 (1962). He could have omitted *except in legal usage* and *semi-*.

Another usage critic (following Fowler) has given somewhat narrower guidelines, for the term is still sometimes used in Scotland: "[A]part from its use in Scotch law courts, [*anent*] is archaic." Margaret Nicholson, *A Dictionary of American-English Usage* 25 (1957). Perhaps the best statement is that *anent* "is a pompous word and nearly always entirely useless." Percy Marks, *The Craft of Writing* 47 (1932).

The term was not uncommon through the first half of the 20th century. E.g., "*Anent* [read *With regard to*] the dismissal, the bank's attorney testified that . . . the memorial company had advertised the property for sale on December 7." *Gandy v. Cameron State Bank,* 2 S.W.2d 971, 973 (Tex. Civ. App.—Austin 1927). Today it occurs only infrequently in legal writing, but examples of it can still be found: "The district court denied Fiat's motion to dismiss . . . and ordered the parties to resolve any dispute *anent* [read *about* or *over*] service on that basis." *Boreri v. Fiat S.P.A.,* 763 F.2d 17, 19 (1st Cir. 1985).

anesthetic, n.**; anesthesia.** An *anesthetic* (e.g., ether) causes *anesthesia* (= loss of sensation). AmE prefers these spellings, BrE *anaesthetic, anaesthesia.*

anesthetist; anesthesiologist. Generally, *anesthetist* will serve for "one who administers an anesthetic." The term dates from the late 19th century. *Anesthesiologist,* of World War II vintage, refers specifically to a physician specializing in anesthesia and anesthetics.

ANFRACTUOSITY, or syntactic twisting and turning and winding, has been one of the historical banes of legal prose. It was more common in the late 19th and early 20th centuries than it is today. Let us trace our gradual liberation from anfractuosity, while noting some modern throwbacks. The following is a classic 19th-century example:

> Unless the code, by abolishing the distinction between actions at law and suits in equity, and the forms of such actions and suits, and of pleadings theretofore existing, intended to initiate, and has initiated new principles of